

We claim:

1. A capacitive load drive recovery circuit comprising:

a transformer having a primary coil
5 connected between an output terminal to be connected to a capacitive load and a first reference potential and a secondary coil connected to the output terminal and a second reference potential;

a first switch circuit connected in series
10 to the primary coil;

a second switch circuit connected in series to the secondary coil; and

a power supply switch circuit connected between the output terminal and a drive power supply.

15 2. A capacitive load drive recovery circuit, as set forth in claim 1, further comprising a third switch circuit connected between the output terminal and the first reference potential.

20 3. A capacitive load drive recovery circuit, as set forth in claim 2, wherein the third switch circuit is composed of a one-way conductive element.

4. A capacitive load drive recovery circuit, as set forth in claim 1, wherein the second switch circuit is composed of a one-way conductive element.

25 5. A capacitive load drive recovery circuit, as set forth in claim 1, wherein the first reference potential and the second reference potential are equal.

30 6. A capacitive load drive recovery circuit, as set forth in claim 1, further comprising: a fourth switch circuit connected between the connection point where the primary coil and the first switch are connected; and a fifth reference potential.

35 7. A capacitive load drive recovery circuit, as set forth in claim 1, further comprising: a fourth switch circuit connected between the connection point where the primary coil and the first switch are connected; and the drive power supply.

8. A capacitive load drive recovery circuit, as set forth in claim 6, wherein the fourth switch circuit is composed of a one-way conductive element.

5 9. A capacitive load drive recovery circuit, as set forth in claim 1, further comprising an impedance circuit connected to a path to which the power supply switch circuit is connected.

10 10. A capacitive load drive recovery circuit comprising:
a first switch circuit, a coil and a
second switch circuit connected in series between an
output terminal connected to a capacitive load and a
first reference potential;
a third switch circuit connected between
15 the connection point where the first switch circuit and
the coil are connected, and the first reference
potential;
a fourth switch circuit connected between
the connection point where the coil and the second switch
20 circuit are connected, and the output terminal; and
a power supply switch circuit connected
between the output terminal and a drive power supply.

25 11. A capacitive load drive recovery circuit, as set forth in claim 10, wherein the third switch circuit is composed of a one-way conductive element.

12. A capacitive load drive recovery circuit, as set forth in claim 10, wherein the fourth switch circuit is composed of a one-way conductive element.

30 13. A capacitive load drive recovery circuit, as set forth in claim 10, further comprising an impedance circuit connected to a path to which the power supply switch circuit is connected.

35 14. A capacitive load drive circuit comprising:
a plurality of capacitive loads;
a first drive power supply;
a second drive power supply; and
a plurality of pairs of first and second

drive elements connected in series between the first
drive power supply and the second drive power supply,
driving the plurality of capacitive loads, respectively,
and the connection point of which is being connected to
5 the capacitive loads,

wherein either one of the first and second
drive power supplies is the capacitive load drive
recovery circuit set forth in claim 1.

15. A capacitive load drive circuit comprising:
10 a plurality of capacitive loads;
a first drive power supply;
a second drive power supply; and
a plurality of pairs of first and second
drive elements connected in series between the first
15 drive power supply and the second drive power supply,
driving the plurality of capacitive loads, respectively,
and the connection point of which is being connected to
the capacitive loads,

wherein either one of the first and second
20 drive power supplies is the capacitive load drive
recovery circuit set forth in claim 10.

16. A capacitive load drive circuit, as set forth
in claim 14, further comprising: a current detection
circuit being provided in a path to which the power
25 supply switch circuit of the capacitive load drive
recovery circuit used as one of the first and second
drive power supplies and detecting a current flowing out
from the drive power supply; and a control circuit
controlling each switch circuit of the capacitive load
30 drive recovery circuit according to the detection result
of the current detection circuit.

17. A capacitive load drive circuit, as set forth
in claim 15, further comprising: a current detection
circuit being provided in a path to which the power
35 supply switch circuit of the capacitive load drive
recovery circuit used as one of the first and second
drive power supplies and detecting a current flowing out

from the drive power supply; and a control circuit controlling each switch circuit of the capacitive load drive recovery circuit according to the detection result of the current detection circuit.

5 18. A capacitive load drive circuit, as set forth in claim 14, further comprising a control circuit calculating an estimated value of power consumption in a drive circuit from information about changes in each drive state of the plurality of capacitive loads and
10 controlling each switch circuit of the capacitive load drive recovery circuit according to the calculated estimated value of the power consumption.

 19. A capacitive load drive circuit, as set forth in claim 15, further comprising a control circuit
15 calculating an estimated value of power consumption in a drive circuit from information about changes in each drive state of the plurality of capacitive loads and controlling each switch circuit of the capacitive load drive recovery circuit according to the calculated
20 estimated value of the power consumption.

 20. A capacitive load drive circuit, as set forth in claim 14, further comprising: a temperature detection circuit detecting temperature of a part of the capacitive load drive circuit; and
25 a control circuit controlling each switch circuit of the capacitive load drive recovery circuit according to the temperature detected by the temperature detection circuit.

 21. A capacitive load drive circuit, as set forth
30 in claim 15, further comprising: a temperature detection circuit detecting temperature of a part of the capacitive load drive circuit; and

 a control circuit controlling each switch circuit of the capacitive load drive recovery circuit
35 according to the temperature detected by the temperature detection circuit.

 22. A plasma display apparatus comprising:

a plasma display panel having a plurality of scan electrodes extending in a first direction and a plurality of address electrode arranged so as to intersect the scan electrodes;

5 a scan electrode drive circuit driving the plurality of scan electrodes; and

an address electrode drive circuit driving the plurality of address electrodes,

10 wherein the power supply of the address electrode drive circuit is the capacitive load drive recovery circuit set forth in claim 1.

23. A plasma display apparatus comprising:

15 a plasma display panel having a plurality of scan electrodes extending in a first direction and a plurality of address electrode arranged so as to intersect the scan electrodes;

a scan electrode drive circuit driving the plurality of scan electrodes; and

20 an address electrode drive circuit driving the plurality of address electrodes,

wherein the power supply of the address electrode drive circuit is the capacitive load drive recovery circuit set forth in claim 10.

24. A capacitive load drive circuit comprising:

25 a plurality of capacitive loads;

a first drive power supply;

a second drive power supply; and

30 a plurality of pairs of first and second drive elements connected in series between the first drive power supply and the second drive power supply, and the connection point of which is connected to the plurality of capacitive loads, respectively,

35 wherein either one of the first and second drive power supplies is a power recovery power supply equipped with a reactive power recovery circuit, and

wherein the power recovery power supply comprises a power detection circuit detecting power

consumption in the drive circuit and a control circuit controlling the action of the reactive power recovery circuit according to the detection result of the power detection circuit.

5 25. A capacitive load drive circuit, as set forth in claim 24, wherein the power detection circuit comprises a current detection circuit detecting a current to be supplied to the power recovery power supply and calculates power consumption in the drive circuit
10 according to the detection result of the current detection circuit.

 26. A capacitive load drive circuit, as set forth in claim 24, wherein the power detection circuit calculates power consumption in the drive circuit from
15 information about changes in each drive state of the plurality of capacitive loads.

 27. A capacitive load drive circuit, as set forth in claim 24, wherein the power detection circuit comprises a temperature detection circuit detecting the
20 temperature of a part of the drive circuit and calculates a power consumption in the drive circuit according to the temperature detected by the temperature detection circuit.

 28. A capacitive load drive circuit comprising:
25 a capacitive load having two drive terminals;
 a first drive power supply;
 a second drive power supply;
 a first switch circuit, a coil and a
30 second switch circuit connected in series between the two terminals of the capacitive load;
 a third switch circuit connected between either terminal of the capacitive load and either
terminal of the first drive power supply;
35 a fourth switch circuit connected between either terminal of the capacitive load and the other terminal of the first drive power supply;

a fifth switch circuit connected between the connection point where the first switch and the coil are connected, and the other terminal of the first drive power supply;

5 a sixth switch circuit connected between the other terminal of the capacitive load and either terminal of the second drive power supply;

a seventh switch circuit connected between the other terminal of the capacitive load and the other
10 terminal of the second drive power supply; and

an eighth switch circuit connected between the connection point where the second switch and the coil are connected, and the other terminal of the second drive power supply.

15 29. A capacitive load drive circuit comprising:

a capacitive load having two drive terminals;

a first drive power supply;

a second drive power supply;

20 a first switch circuit connected between either terminal of the capacitive load and either terminal of the first drive power supply;

a second switch circuit connected between either terminal of the capacitive load and the other
25 terminal of the first drive power supply;

either coil of a transformer and a third switch circuit connected in series between either terminal of the capacitive load and the other terminal of the first drive power supply;

30 a fourth switch circuit connecting the two terminals of the first drive power supply selectively to a first reference potential;

a fifth switch circuit connected in parallel to the second switch circuit;

35 a sixth switch circuit connected in parallel to the third switch circuit;

a seventh switch circuit connected between

the other terminal of the capacitive load and either
terminal of the second drive power supply;

an eighth switch circuit connected between
the other terminal of the capacitive load and the other
5 terminal of the second drive power supply;

the other coil of the transformer and a
ninth switch circuit connected in series between the
other terminal of the capacitive load and the other
terminal of the second drive power supply;

10 a tenth switch circuit connecting the two
terminals of the second drive power supply selectively to
a first reference potential;

an eleventh switch circuit connected in
parallel to the eighth switch circuit; and

15 a twelfth switch circuit connected in
parallel to the ninth switch circuit.

30. A plasma display apparatus comprising:

a plasma display panel having a plurality
of first and second electrodes arranged alternately and
20 extending in a first direction and a plurality of address
electrodes arranged so as to intersect the first and
second electrodes;

a first electrode drive circuit driving
the plurality of the first electrodes;

25 a second electrode drive circuit driving
the plurality of the second electrodes; and

an address electrode drive circuit driving
the plurality of the address electrodes,

wherein the second electrode drive circuit
30 comprises a scan circuit applying a scan pulse
sequentially to the plurality of the second electrodes
and a common drive circuit applying a sustain pulse
simultaneously to the plurality of the second electrodes
via the scan circuit,

35 wherein the first electrode drive circuit
and the common drive circuit are plasma display
apparatuses applying the sustain pulse alternately to the

plurality of the first and second electrodes, and
wherein the first electrode drive circuit
and the common drive circuit are the capacitive load
drive circuits as set forth in claim 28.

5 31. A plasma display apparatus comprising:

a plasma display panel having at least a
pair of electrodes making up a capacitive load and
causing discharge to occur between the pair of
electrodes; and

10 a capacitive load drive circuit connected
at least either electrode of the pair of electrodes and
driving the capacitive load,

wherein the capacitive load drive circuit
has a coil circuit connected between an output terminal
15 to be connected to the one of electrodes and a reference
potential and controls so that when the energy stored in
the capacitive load is discharged, the energy is stored
in the coil circuit and at the same time the energy is
retained in the coil circuit while the current flowing
20 through the coil circuit is increasing, and when the
capacitive load is recharged, the stored energy is
released while the current flowing through the coil
circuit is decreasing.

25 32. A plasma display apparatus, as set forth in
claim 31, wherein a switch circuit maintaining the
discharged state of the capacitive load after the
capacitive load is discharged and until it is recharged,
and a power supply switch circuit maintaining the charged
state of the capacitive load after the capacitive load is
30 charged and until it is discharged again.

33. A plasma display apparatus, as set forth in
claim 32, wherein the switch circuit is composed of a
one-way conductive element.

35 34. A plasma display apparatus, as set forth in
claim 32, wherein the power supply switch circuit is
controlled so as to be brought into a conductive state
before the charging of the capacitive load is completed.

35. A plasma display apparatus, as set forth in claim 32, wherein the energy is stored in the coil circuit via the one of the electrodes when the energy stored in the capacitive load is discharged and the released energy is supplied to the capacitive load via the one of the electrodes when the capacitive load is recharged.

36. A plasma display apparatus, as set forth in claim 32, wherein the capacitive load drive circuit is connected between the one of electrodes and the other of the pair of electrodes, stores the energy in the coil circuit via the one of electrodes when the energy stored in the capacitive load is discharged, and supplies the released energy to the capacitive load via the other electrode when the capacitive load is recharged.

37. A plasma display apparatus comprising:
a plasma display panel having a plurality of scan electrodes and a plurality of address electrodes arranged so as to intersect the scan electrodes;
a scan electrode drive circuit driving the plurality of scan electrodes; and
an address electrode drive circuit driving the plurality of address electrodes,
wherein the address electrode drive circuit has a coil circuit connected between an output terminal to be connected to the address electrode and a reference potential and controls so that when the energy stored in the capacitive load consisting of the address electrodes and the scan electrodes is discharged, the energy is stored in the coil circuit and at the same time the energy is retained in the coil circuit while the current flowing through the coil circuit is increasing, and when the capacitive load is recharged, the stored energy is released while the current flowing through the coil circuit is decreasing.